COLORADO DEPARTMENT OF AGRICULTURE

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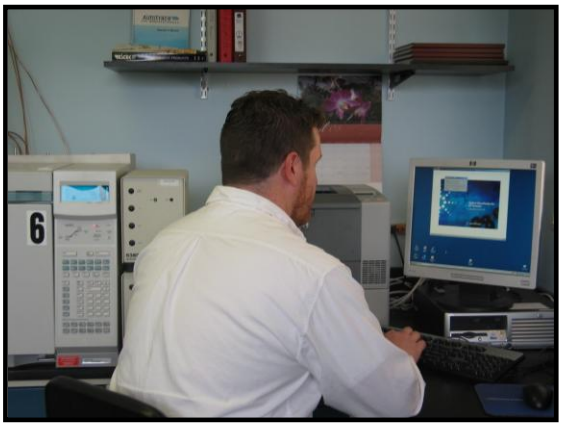
Groundwater Analysis Program

The Colorado Department of Agriculture's Biochemistry Laboratory (BCL) provides analytical testing services to the Divisions of Inspection & Consumer Services, Conservation Services, and Plant Industry. BCL also provides analytical services to three USDA grant programs (Pesticide Data Program, Microbiological Data Program and Food Emergency Response Network). Analyses are performed on a wide variety of samples including groundwater, animal feeds, fertilizers, soils, sediments, vegetation, and pesticide formulations. The Biochemistry Laboratory is organized into six Sections: Groundwater, Pesticides, Microbiology, Animal Feeds, and Fertilizers.

The Groundwater and Pesticides Sections analyze a variety of pesticides, herbicides, insecticides, rodenticides, and fungicides. Pesticides, insecticides, and rodenticides are agents of chemical or biological origin used to control pests and insects that cause damage to crops in the field and in storage. Herbicides and fungicides are chemicals designed specifically for killing weeds and harmful fungal species. Correctly used and applied, pesticides are very beneficial for agricultural production through increased crop yields, efficient weed control, and reduced spoilage.

Like any class of chemical or biological agents, misuse, excess application, and improper handling or storage of pesticides can result in harmful human exposure and/or environmental contamination. CDA regulates the use of pesticides in the State through product registration and applicator licensing, and monitors levels of pesticide residues in ground waters. BCL supports these programs through sample testing. Samples tested for the Groundwater Program include: private wells, wells on public lands, irrigation wells, and other sources of groundwater that may have the potential to be impacted from agricultural operations. BCL, along with the US Environmental Protection Agency (Region VIII) and Colorado Department of Public Health & Environment, also test a selected number of surface water samples collected during the sampling season.

Groundwater Section Laboratory



The Groundwater Laboratory (GWL) performs testing of groundwater samples for the presence of over 100 different pesticide compounds, and to determine Nitrate/Nitrite levels. The Groundwater Protection Program has collected samples from over 1,100 wells across the state.

Wells are grouped geographically and sampled on a rotating basis. Each year, the Groundwater Section Laboratory tests over 300 analytical samples.

The GWL is staffed with one full-time Chemist and up to two laboratory technicians during heavy sampling seasons. The GWL facility is equipped with the latest generation of analytical instrumentation and equipment to support the pesticide-related testing needs of the Groundwater Program. To keep pace with the dynamic nature of pesticide and fertilizer usage in the State, the GWL is re-tooling some of its sample preparation and analysis processes. The latest generation liquid chromatograph-triple quadrupole mass

spectrometer is being procured this fiscal year with funding support from the Commissioner's Office and USEPA. This upgrade in instrumentation and extraction equipment requires that a portion of the pesticides analysis work will be performed at a subcontract facility for the 2009 sampling season. After the new equipment and instrumentation is verified and validated, it will be brought on-line for the 2010 sampling season. Upgrading the analytical system will enable the GWL to look for over 100 pesticides in groundwater samples collected.

During the 2009 sampling campaign, BCL will be analyzing all the samples collected for nitrate and nitrite levels. A subset of samples collected will be screened for the presence of Triazine compounds using immunoassay techniques. Samples from selected aquifers will be analyzed for two specialty pesticides—Metribuzin and Lindane.

The GWL uses several types of instrumentation systems to test groundwater samples. Samples are analyzed for Nitrate/Nitrite levels using ion chromatography. The turnaround time for Nitrate/Nitrite analyses is 48 hours. After this time, the Nitrate/Nitrite levels may begin to degrade, so the samples must be prepared and analyzed quickly after collection. Any levels found that exceed the safe drinking water limits are reported to the well owner(s). Gas chromatography/mass spectrometry systems are used to identify individual pesticide compounds that may be present in groundwater samples. This instrumentation is able to separate, isolate, and accurately identify nearly 60 different pesticide analytes. Liquid chromatography/quadrupole mass spectrometry is used to separate and identify over 40 analytes.

Pesticide testing is challenging chemistry for a number of reasons. Many of the compounds partially degrade or breakdown in the environment. Several classes of pesticides are notoriously difficult to separate and isolate. Sophisticated sample preparation processes and expert spectroscopy techniques are required to deliver accurate and usable results.

The Biochemistry Laboratory is fortunate to have a team of highly-skilled, experienced, and knowledgeable scientists with expert spectroscopy techniques to perform groundwater testing for the Department.

Click on this link, for more information on the Biochemistry Laboratory, or e-mail Keith Wegner, Biochemistry Laboratory Section Chief.